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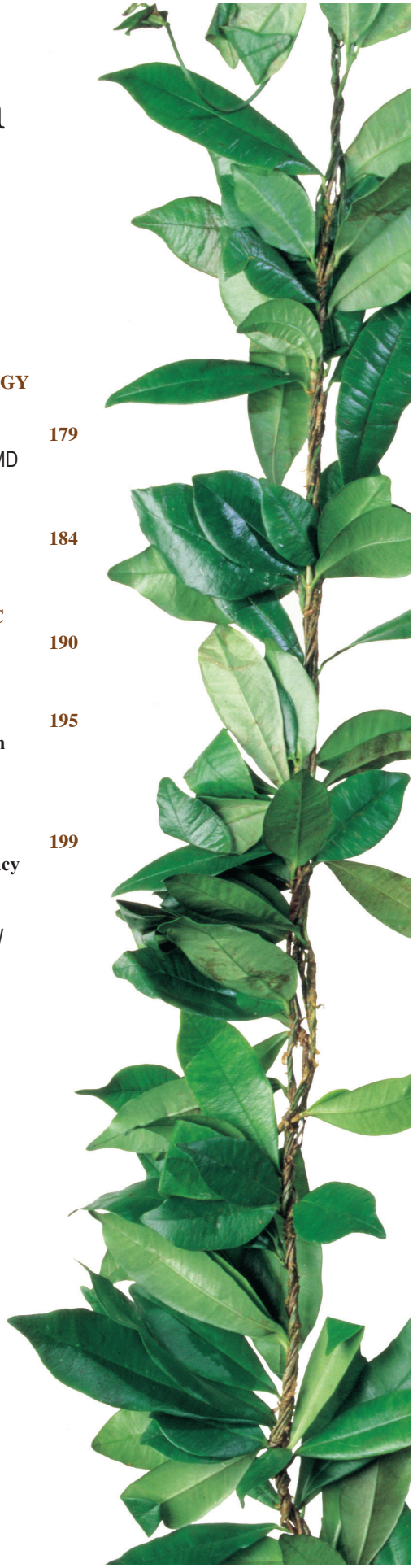

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Aim:

The aim of the Hawai‘i Journal of Health & Social Welfare is to advance knowledge about health and social welfare, with a focus on the diverse peoples and unique environments of Hawai‘i and the Pacific region.

History:

In 1941, a journal then called The Hawai‘i Medical Journal was founded by the Hawai‘i Medical Association (HMA). The HMA had been incorporated in 1856 under the Hawaiian monarchy. In 2008, a separate journal called the Hawai‘i Journal of Public Health was established by a collaborative effort between the Hawai‘i State Department of Health and the University of Hawai‘i at Mānoa Office of Public Health Studies. In 2012, these two journals merged to form the Hawai‘i Journal of Medicine & Public Health, and this journal continued to be supported by the Hawai‘i State Department of Health and the John A. Burns School of Medicine.

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Perceptions Regarding Pediatric and Adolescent Gynecology Training among Obstetrics and Gynecology Residents in Hawai‘i

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Abstract

A pediatric and adolescent gynecology curriculum was implemented for obstetrics/gynecology residents at a single institution in Hawai‘i. The primary objective of this study was to evaluate the effectiveness of this pediatric and adolescent gynecology (PAG) formal curriculum in improving knowledge. Twelve residents at the University of Hawai‘i completed the curriculum during their second year of training. Of these, 6 residents completed an examination assessing knowledge both before and immediately after the curriculum. Five of these residents completed the examination 1-2 years after completing the curriculum. Average pre-rotation examination scores were 57%, which increased significantly immediately after the curriculum to 87% (P=.003) and remained significantly higher after 1-2 years with average scores of 71% (P=.025). A secondary objective was to assess resident comfort and confidence levels in the subject. All residents who completed the curriculum completed surveys assessing comfort in their pediatric and adolescent gynecology training and both perceived confidence and competence in this area. Despite completing the curriculum, 7 of 12 (58%) did not feel comfortable evaluating pediatric gynecology patients, and 5 of 12 (42%) did not feel prepared nor competent to care for pediatric and adolescent patients. A formal pediatric and adolescent gynecology curriculum increased examination performance, which suggests knowledge retention. However, despite curriculum completion, residents still desired more training in the subject area. Residency programs should consider innovative ways to incorporate inpatient and outpatient educational experiences, periodic testing, and feedback longitudinally throughout residency training to improve long-term retention, confidence, and competence in providing gynecologic care in the pediatric and adolescent gynecology population.

Keywords

pediatric adolescent gynecology, residency training, curriculum, resident education

Abbreviations and Acronyms

ANOVA = analysis of variance
ASRM = American Society for Reproductive Medicine
CREOG = Council on Resident Education in Obstetrics and Gynecology
NASPAG = North American Society for Pediatric and Adolescent Gynecology
OB/GYN = obstetrics and gynecology
PAG = pediatric adolescent gynecology

Introduction

Obstetric and gynecologic providers are often called upon to care for female children and adolescents. Pediatric and adolescent gynecology (PAG) is an essential and required aspect of obstetrics and gynecology (OB/GYN) residency training.[1] In the United States, the proportion of adolescents who are sexually active increases rapidly with age, with over 50% of females sexually active by age 18.[2] These adolescents and young adults aged 15–24 years also account for approximately half of newly diagnosed sexually transmitted infections.[3,4] Furthermore, adolescents aged 10–14 years represent 8% of the total world population.[5,6] This statistic has resulted in more focused attention on this specialty, as demonstrated by some recent publications describing successful PAG teaching methods.[7,8] In addition, many obstetrics and gynecology program directors have expressed interest in expanding the PAG training in their programs.[9]

There is considerable variation in PAG exposure in OB/GYN residency programs across the country, with a limited number of programs having PAG expertise.[1] In a survey of OB/GYN residency program directors, only 38% of programs had exposure to PAG specialists.[9] A cross-sectional study aimed to estimate the prevalence of PAG formal training in the United States. OB/GYN residency programs found that 63% (n=65) have no formal dedicated PAG clinic, 83% (n=87) have no outpatient PAG rotation, and 58% (n=57) had less than 4 hours of didactics dedicated to PAG.[10] Furthermore, another study surveyed 2 large OB/GYN residency programs in Michigan and revealed that most residents in both academic and community programs reported no PAG rotations or clinics and limited didactic sessions.[11] This limited exposure may be responsible for the lack of basic PAG knowledge, as demonstrated by poor scores on knowledge-based questions. However, residents have overwhelmingly expressed a desire for more PAG training.

With the knowledge that there is still a lack of PAG training, the North American Society for Pediatric and Adolescent Gynecology (NASPAG) published the “Long Curriculum” (a comprehensive program in PAG for resident education),[12,13] a 2 week “Short Curriculum” with specific learning objectives in 2014,[1,13] and just recently released the “Short Curriculum 2.0.”[14] One study revealed significant deficiencies in residents’ self-reported knowledge of core PAG topics, which improved after utilizing the “Short Curriculum.”[15] A follow-up study evaluating the effectiveness of the “Short Curriculum” for 3 residency subspecialties demonstrated that the curriculum improved knowledge in OB/GYN, family medicine, and pediatric residents.[16] The American College of Obstetrics and Gynecology also recognize the importance of PAG and have added PAG objectives into the Council on Resident Education in Obstetrics and Gynecology (CREOG) Educational Objectives.[17]

The University of Hawai‘i OB/GYN residency program has a formal PAG curriculum in the second year. This curriculum involves assigned reading materials, didactic lectures, clinic

experience, and completion of American Society for Reproductive Medicine (ASRM) learning modules. The curriculum developed was based on the NASPAG short curriculum and CREOG Educational Objectives. Each second-year resident completes the PAG curriculum during their two-month rotation through the adolescent obstetrics and gynecology clinic. The clinic's patient population primarily comprises of adolescent patients seeking obstetric or gynecologic care. This study aimed to evaluate the effectiveness of the current PAG curriculum at the University of Hawai'i. The study examines two measures of PAG curriculum effectiveness: (1) knowledge retention and (2) comfort, confidence, and perceived competence in caring for pediatric and adolescent gynecologic patients.

Methods

This study compromised of a retrospective cohort in the University of Hawai'i Obstetrics and Gynecology Residency Program. University of Hawai'i Institutional Review Board approval was obtained. Twelve residents completed the PAG curriculum during their second year of residency. Of these residents, 6 residents completed an examination to test knowledge of various aspects of PAG before the start of their formal PAG curriculum and immediately after curriculum completion. Five of these 6 residents were retested 2 years later to assess long-term retention. The knowledge examination was untimed, closed book, and consisted of various question design types, including multiple choice, short answer, true/false, and fill in the blank. Questions were based on cases found in the Gynecology and Reproductive Endocrinology Infertility versions of the Personal Review of Learning in Obstetrics and Gynecology, known as PROLOG,[18,19] in addition to the rotation learning objectives and suggested rotation reading material. Obstetrics and gynecology residency programs require 4 years of training. At the University of Hawai'i, the PAG curriculum is completed during the second year. Thus, only third- and fourth-year residents had completed the PAG curriculum at the time of the study. The third- and fourth-year classes each consisted of 6 residents. The fourth-year residents completed the examination again approximately 2 years after they had completed the curriculum. This examination administration model was chosen based on the literature on long-term retention,[20] suggesting that providing frequent quizzes,[21-23] pretesting,[24] and feedback improves long-term retention.

Examination scores were obtained through a search of computerized program records by the principal investigator. To assess resident comfort, confidence, and perceived competence in caring for PAG patients after curriculum completion, a survey was administered to the third- and fourth-year residents who had completed the PAG curriculum. Data were collected anonymously. Responses were rated on a Likert scale of 1 to 5 with "strongly agree" assigned a value of 5 and "strongly disagree" with a value of 1. Surveys included demographic information and opinions regarding their confidence, comfort, and perceived competence in evaluating and caring for PAG patients. Although not validated, the survey instrument was pretested to assure clarity. All results were recorded on a password-protected Excel spreadsheet. All subjects were de-identified, and a key with codes that linked the subjects to their individualized scores was kept in a separate password-protected Word document to which only the principal investigator had access. Only de-identified data was used for statistical analysis. Survey results were evaluated using descriptive statistics. Exam scores were evaluated via paired t-test and analysis of variance (ANOVA) statistics. Paired t-test analysis was performed on the pre-rotation and immediate post-rotation scores, using GraphPad's QuickCalcs (www.graphpad.com). Examination scores were also analyzed using ANOVA statistical analysis, using the Social Science Statistical online calculator (www.socscistatistics.com).

Results

Twelve residents completed the PAG curriculum during their second year of residency. Of these, 6 residents completed an examination assessing knowledge retention before and immediately after the formal PAG curriculum, and 5 completed the examination 1–2 years after completing the PAG curriculum (Table 1). Overall, mean examination scores increased 30% immediately after the curriculum (P=.003) and remained 14% points higher after 1–2 years (P=.025), suggesting retention of the material.

A survey was distributed to the same cohort of 12 residents who completed the PAG curriculum as second-year residents to assess confidence, comfort, and perceived competence in evaluating and caring for PAG patients. The survey results are displayed in Table 2. Of the 12 residents, 5 (42%) agreed, and 2 (17%) strongly agreed that they intend to care for pediatric gynecologic patients. Furthermore, 6 (50%) agreed, and 4 (33%) strongly agreed that they intend to care for adolescent gynecologic patients in their future practice. Overall, only 2 residents (17%) who completed the curriculum agreed that they felt confident, and only 2 residents (17%) agreed that they felt prepared and competent to care for pediatric and adolescent patients with gynecologic problems. Of note, only 1 (8%) respondent agreed that they felt comfortable evaluating pediatric patients, while 8 residents (67%) agreed that they felt comfortable evaluating adolescent patients.

Table 1. Examination Performance Results (N=6)			
	Examination Scores (%)		
Resident	Pre-Rotation	Immediate Post-Rotation	>1 Year Post-Rotation
A	63.0	86.7	80.8
B	63.0	92.5	90.0
C	36.7	89.1	59.2
D	42.0	75.8	68.3
E	58.3	82.5	56.7
F	78.3	97.4	ND
Mean	57.0	87.0	71.0
Standard Deviation	15.3	7.6	14.2
ANOVA	*P*=.003		

Abbreviations: ANOVA, analysis of variance; ND, not determined

Table 2. Resident Confidence and Comfort Level (N=12)					
Statement	Strongly Disagree N (%)	Disagree N (%)	Neither Agree nor Disagree N (%)	Agree N (%)	StronglyAgree N (%)
I feel comfortable evaluating pediatric gynecology patients.	0 (0%)	7 (58%)	4 (33%)	1 (8%)	0 (0%)
I feel comfortable evaluating adolescent gynecology patients.	0 (0%)	1 (8%)	3 (25%)	8 (67%)	0 (0%)
I feel confident in my knowledge on gynecologic problems in the pediatric and adolescent population.	1 (8%)	6 (50%)	3 (25%)	2 (17%)	0 (0%)
I feel prepared and competent taking care of PAG patients.	0 (0%)	5 (42%)	5 (42%)	2 (17%)	0 (0%)
I plan to care for pediatric gynecology patients	1 (8%)	2 (17%)	2 (17%)	5 (42%)	2 (17%)
I plan to care for adolescent gynecology	1 (8%)	0 (0%)	1 (8%)	6 (50%)	4 (33%)

Abbreviation: PAG, pediatric adolescent gynecology

Discussion

This study has demonstrated that a formal PAG curriculum can significantly increase subject-specific exam performance. Having a well-defined PAG program has been shown in other programs to enhance resident education and provide better tools to perform gynecologic evaluations in children and adolescents.[25] Residents who reported having a well-defined program had significantly higher scores when asked to identify normal prepubertal genitalia and diagnose common gynecologic disorders. As such, residency programs have sought to utilize and incorporate various teaching methods to foster higher yield learning and retention of the PAG curriculum. These methods include advanced pelvic simulation session,[26-28] web-based case-based learning,[8,29] videoconferencing,[30] effective feedback strategies,[31] and the "one minute preceptor model."[32]

Although various PAG curriculums have been shown to be effective, there are some discrepant results. One residency program developed a PAG curriculum, including outpatient clinic experience, lectures, online modules, and simulation. After implementation, it improved resident comfort level when managing PAG patients but no significant improvement in knowledge.[33] Training is imperative for clinicians to enhance the quality of care for children and adolescents with gynecologic problems. Still, the lack of training in this field is not unique to the United States. In a survey of 27 European countries that are members of the European Board and College of Obstetrics and Gynecology, only half included PAG in their national curriculum, and of those, only 55% provided PAG training.[34] Another study centered on evaluating an advanced pelvic simulation session demonstrated that simulation improved residents' knowledge, technical skills, and comfort level in the pediatric examination.[26] A subsequent study utilizing an advanced pelvic simulation curriculum confirmed those findings, with significant increases in objective structured clinical examination scores.[27] This current study demonstrated a significant increase in PAG written examination scores after PAG curriculum completion, which was maintained for almost 2 years. These differences in knowledge retention may result from the variability in the

curriculum design at various programs and the variability in clinical experiences available at each training site.

It is not uncommon that obstetrics and gynecology residents are less comfortable caring for pediatric and adolescent gynecologic patients than adult patients. This finding has been demonstrated by studies in the past, in which residents either indicated that their residency training in PAG was insufficient[35] or felt uncomfortable and inadequately prepared to provide routine gynecologic care to adolescents.[36,37] One study showed that despite access to formal training in PAG, many physicians still experienced difficulties assessing pre-pubertal female anatomy and stressed the need for a library of images depicting normal anatomy and common gynecologic conditions be included as an educational tool.[8] Focus groups centered on resident perceptions of their adolescent reproductive health training revealed that they believed didactic lectures alone were insufficient and diverse inpatient and outpatient clinical experiences were needed.[38] This current study found that despite completing an effective dedicated curriculum associated with sustained improved examination performance, residents still expressed subjective concerns regarding their confidence, comfort, and perceived competence in evaluating and caring for this particular patient population. This discomfort was noted primarily in the pediatric population. This discrepancy in comfort between pediatric and adolescent cases despite apparent adequate knowledge may be secondary to differences in actual real-time clinical exposure. University of Hawai'i residents have a large adolescent gynecology patient volume relative to their pediatric gynecology patient volume. This statistic may be unique to the specific patient population at the University of Hawai'i. Therefore, despite a structured, well-designed PAG curriculum, residency programs should self-evaluate their own situation, their available resources, identify any potential gaps in training, and consider innovative ways to structure their PAG curriculum to meet their unique needs. Training may be accomplished by utilizing various educational tools, incorporating varying clinical experiences, and providing feedback to their residents.

The strength of our study is that data was collected among the same pool of residents who underwent a similar curriculum over the evaluation period. This analysis demonstrates that resident scores improved significantly without the mean of the group being pulled up by 1 or 2 residents doing exceptionally better.

This study is not without limitations. This study was performed using a retrospective cohort at a single institution with a small sample size and short duration, so our findings of sustained improved subject exam performance after a formal PAG curriculum may not apply to other residency programs. Each program is encouraged to perform a detailed self-evaluation to determine its own needs and potential gaps to best structure a curriculum suited to address its specific needs. Additionally, this retrospective study cannot assess the true effect of this PAG curriculum on long-term exam performance. There are likely other rotations where residents are exposed to PAG-related clinical experiences and training throughout their four years of training. Thus, it is unlikely that the PAG curriculum is the sole influencer of resident exam performance. Finally, although sustained improvements in written exam performance suggest long-term knowledge retention, it is only one tool and may not accurately reflect actual knowledge in the subject area. Future studies should assess the true impact of a PAG curriculum on the long-term retention of knowledge in this subject area.

Residency programs should consider innovative ways to incorporate PAG educational experiences (including inpatient and outpatient), periodic testing, and feedback longitudinally throughout residency training to improve long-term retention, confidence, and competence in caring for this population. Since each training program is unique, they should self-evaluate their program and design a curriculum that best fits their overall curriculum and resource limitations.

Conflict of Interest

There is no conflict of interests or disclosures for any of the authors.

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Understanding Native Hawaiian Caregivers' Beliefs About Pediatric Asthma Management

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Abstract

Native Hawaiian health beliefs and cultural practices may influence how Native Hawaiian caregivers manage their children's asthma. Understanding the use of cultural practices as an asthma management strategy among Native Hawaiian caregivers who have a child with mild persistent, moderate persistent, or severe persistent asthma may inform the development of effective culturally-based asthma management interventions. A qualitative descriptive methodology with medical anthropology framework was used to describe pediatric asthma management strategies, define cultural asthma management practices, and identify cultural practices caregivers were aware of but did not use. Eighteen face-to-face interviews with self-identified Native Hawaiian caregivers of school-aged children between 5 and 12 years with asthma were interviewed. The study found that Native Hawaiian caregivers across all asthma severity types believed that the perceived cause of asthma was hereditary and environmental exposure. Also, standard asthma management strategies were used by caregivers with an emphasis on preventing exposure to known asthma triggers. If asthma symptoms presented themselves, Native Hawaiian caregivers often managed them with alternative practices before using the prescribed medication. Alternative practices included the use of massage and exposure to salt air. Native Hawaiian caregivers readily discussed awareness of cultural practices. However, cultural practices such as lā'au lapa'au (herbal medicine) and lomilomi (massage) were seldom, if ever, used. The study provides healthcare providers with knowledge regarding Native Hawaiian caregivers and their beliefs about the perceived cause of asthma and strategies for managing asthma, including use and awareness of cultural practices.

Keywords

Asthma Management, Cultural Practices, Native Hawaiian Caregivers

Abbreviations

C = Caregiver
CHS = Committee on Human Subjects
ED = Emergency Department
GED = General Education Diploma

Introduction

State of Hawai'i data from 2016 indicates that pediatric asthma prevalence is highest among Native Hawaiian children at 29.7% compared to 20.4% in white children.[1] In the state of Hawai'i, the emergency department (ED) visits for those 5 to 64 years is 51.9 per 10 000 people of all ethnic groups combined.[2] Studies found an increase in ED visits when vog was present.[3-5] Vog is volcanic smog with a haze appearance caused by the mixing of sulfur dioxide with the atmosphere.[6]

Native Hawaiian health beliefs and cultural practices may influence how Native Hawaiian caregivers manage their child's asthma. There is limited research and data available on how Native Hawaiian caregivers manage their school-age child's (5–12 years) asthma, including which cultural practices are used and whether caregivers are aware of Native Hawaiian cultural practices to manage asthma. Understanding the use of cultural practices as an asthma management strategy among Native Hawaiian caregivers who have a child with mild persistent, moderate persistent, or severe persistent asthma may inform the development of effective culturally-based asthma management interventions for this population. Based on personal communications with *kūpuna* (elders) and cultural practitioners, Native Hawaiian asthma management strategies are based on maintaining balance in life, preventing asthma through healthy living, and in some cases, using traditional practices such as herbal medicines and massage therapy (Kupuna 1, personal communication, July 25, 2013; Kupuna 2, personal communication, September 17, 2013; and Kupuna 3, personal communication, September 23, 2013).

Consideration of the worldview, health beliefs, and cultural practices of Native Hawaiians may improve pediatric asthma management. The purpose of this study was to describe Native Hawaiian caregivers' practices in managing pediatric asthma.

Methods

A qualitative descriptive methodology with interviews was used. Qualitative descriptive methodology is a type of qualitative research in which the scope is limited and allows for a description of a specific phenomenon.[7] This methodology does not focus on 1 theoretical framework but rather uses the naturalistic inquiry process.[8]

Research questions and the interview guide used a medical anthropology framework. This framework focuses on the study of health and healing from a cross-cultural and evolutionary perspective.[9] Interviews were selected to foster "talk story" or sharing of knowledge between the interviewer and interviewee.[10-12]

A convenience sample of Native Hawaiian adult caregivers of school-aged children between the ages of 5 and 12 years with at least mild-persistent asthma from O'ahu and Hawai'i Island were recruited to participate between May 2014 and December

2015. Participants needed to be able to read and speak English and provide at least 70% of the child's care, which included asthma management and daily activities. If more than 1 child was eligible, the participant was asked to share information about the child with the higher asthma severity.

Recruitment included presentations and dissemination of recruitment flyers at Native Hawaiian Health Organizations and community-based organizations on Oʻahu and Hawaiʻi Island. The presentation provided an overview of the study. Interested individuals contacted the researcher who screened them over the phone or in-person to determine eligibility.

Face-to-face interviews were scheduled with the caregiver between May 2014 and December 2015. The interviews were held at an agreed-upon location, date, and time. Each interview ranged from 15 minutes to 90 minutes. All caregivers consented before the interview, with consent to audio record reconfirmed before the interview began.

The interview guide consisted of a series of semi-structured, open-ended questions (see Appendix). The questions asked the caregiver about his or her beliefs about the cause of asthma, caregiver management strategies, and styles of asthma management. The final question explored the caregivers' knowledge of Native Hawaiian cultural practices used to manage asthma. All interviews were transcribed verbatim and reviewed by a community member for accuracy.

A thematic form of content analysis was used to analyze the data. The purpose of this analysis was to provide knowledge and insight into a phenomenon.[13] Coding reliability was established through a systematic approach to data analysis. The researcher and 2 additional coders independently reviewed the transcripts and coded them. The team met weekly to discuss and establish codes, identify categories, and finally agree on themes. nVivo 10 (QSR International) was used to keep data organized.

The research was reviewed and approved by the Committee on Human Subjects at the University of Hawaiʻi at Mānoa (CHS #21331) and the Native Hawaiian Health Care Systems Institutional Review Board at Papa Ola Lōkahi (#13-N-11).

Results

Forty-one individual caregivers were referred to the study, of which 33 (80%) were screened and 26 (78%) eligible. Of the 26 eligible caregivers, 18 (70%) completed the interview, and 8 (30%) were not interviewed because they were no longer interested, were unable to be reached, or missed the interview time.

A total of 18 Native Hawaiian caregivers from Oʻahu (n=15, 85%) and Hawaiʻi Island (n=3, 15%) were interviewed. These caregivers had a child with mild (n=6, 33%), moderate (n=7, 38%), or severe (n=5, 27%) persistent asthma (Table 1). Seventeen caregivers were female, 1 was male, 15 were married, and 11 employed with a household income range of $35,000 to $50,000. Caregivers of children with mild and moderate persistent asthma completed a high school diploma or General Education Diploma (GED; n=7). All caregivers of a child with severe persistent asthma received at least some college education (n=5) as shown in Table 2.

Two overarching themes and 6 subthemes emerged from the categories: asthma and its causes (theme 1) included 2 subthemes of heredity and environmental exposure; and asthma management (theme 2) included 4 subthemes of engaging in physical activity, alternative practices, responding to asthma symptoms, and preventing exposure to asthma triggers. Each theme and subtheme are presented with direct quotes provided.

Table 1. Caregiver and Child Asthma Severity

Asthma Severity Type	N	%
Mild	6	33
Moderate	7	38
Severe	5	27

Table 2. Participant Characteristics

Characteristic	N	%
Marital Status		
Single	1	6
Married	15	83
Partnered	2	11
Education Level Completed		
High School/GED	7	39
Some College	5	27
College Degree	3	17
Graduate/Professional	3	17
Employment Status		
Full-time	8	44
Part-time	3	17
Unemployed	7	39
Income Range		
Less than $35,000	4	22
$35,001–$50,000	8	44
$50,001–$65,000	3	17
$65,001 or more	3	17

Abbreviation: GED, General Education Diploma

Theme 1. Asthma and its causes

Heredity was the perceived cause of a child's asthma diagnosis. Eight of the 18 caregivers consistently attributed the child's asthma to a positive family history of asthma and identified other family members with asthma. Two caregivers from the mild persistent asthma group could recount up to 5 generations of family members with asthma. Three caregivers from the severe persistent asthma group shared that asthma was hereditary because their parents had asthma. One caregiver from severe persistent asthma group stated, "Okay you know my biggest probably take on it is that it's hereditary, because my father was badly asthmatic." Case (C) 3. Similarly, 3 caregivers from the moderate persistent asthma group believed that it was inevitable that the children have asthma. A caregiver from the moderate persistent group stated, "Well my grandparents had it my great grandparents had it, my dad had it, so now I have it, and now my children have it." C5.

All caregivers discussed exposure to environmental and household triggers. Seven caregivers (mild=1, moderate=4, severe=2) described household irritants as a cause of asthma symptoms. Irritants included odors such as those associated with cleaning solutions, laundry detergent and softener, dryer sheets, and bleach. Household triggers such as dust, smoke, pollen were described by 11 caregivers (mild=5, moderate=4, severe=2). Sixteen caregivers (mild=5, moderate=7, severe=4) minimized exposure to these household triggers through frequent vacuuming, dusting, and washing. A mild persistent caregiver stated, "My [spouse] is almost sterile with cleaning the house, I mean yeah, it gets kind of hard sometimes but [the], [the] lifestyle is just made sure everything is super clean, so the house is clean." C17.

Environmental triggers such as vog, changes in weather, or pollen were discussed by 12 caregivers (mild=4, moderate=5, severe=3). Caregivers were mindful of weather patterns and took preventive steps when the weather changed, or pollen was in the air. In all, exposure was consistently described as a cause of asthma, but the extent varied by asthma severity. Vog was expressed most among caregivers (n=12, mild=4, moderate=5, severe=3) as the cause of his/her child's asthma. A caregiver from the mild persistent group stated, "When we know the vog is going to be present, we try to keep him indoors as much as possible. Not too much outside." C1.

Theme 2. Management strategies

Regular physical activity was described as both a cause and management strategy of asthma. Six caregivers of children with moderate persistent asthma described that engaging children in physical activity prevented asthma symptoms and built lung capacity. Similar descriptions were found among caregivers of children with severe persistent asthma (n=5). Among those with mild persistent asthma (n=3), physical activity was associated with triggering asthma symptoms. Sixteen caregivers, in general, believed in the long-term benefits of engaging in physical activity. They often encouraged the child to participate in simple activities such as running in the yard or park, kicking, hitting a ball, or group sports. A caregiver from the mild persistent group stated, "…I think ever since the age he started sports; his whole episodes have reduced dramatically…" C17.

Caregivers across all asthma severity types (mild=6, moderate=7, severe=5) focused on managing asthma symptoms using alternative practice strategies favoring home remedies and other practices before prescribed medication. The use of menthol-based ointment and the use of essential oils on a cloth or in a humidifier were commonly discussed by caregivers (mild=3, moderate=4, severe=1). Often, menthol-based ointment was used in conjunction with massage and dressing warmly. Caregivers described that the massage relaxed the child and the menthol in the ointment opened the child's airways.

Awareness of commonly known cultural practices such as *lā'au lapa'au* (herbal medicine) and *lomilomi* (massage) was expressed by 11 caregivers (mild=4, moderate=4, severe=3). However, caregivers did not use *lā'au lapa'au,* citing that they did not know any practitioners or knew practitioners who died. They expressed that *lā'au lapa'au* required in-depth knowledge around gathering, preparing, and administering the medicines. *Lomilomi* was used frequently among caregivers (mild=3, moderate=6, severe=3). However, caregivers used the word *lomilomi* to mean any form of massage and not necessarily the traditional practice of *lomilomi*. *Lomilomi* is a cultural practice of massage with specific protocols and intent.[14]

Other practices used to manage asthma symptoms included going to the ocean/saltwater and focusing on living a balanced life. Nine caregivers (mild=5, moderate=4, severe=3) found ocean water a natural way to detoxify the body. Most often, caregivers described having the child play at the seashore and swim in the ocean. In terms of living a balanced life, 6 caregivers (mild=2, moderate=2, severe=2) reported a balanced life necessitated a strong spiritual connection. According to caregivers across all asthma severity types, spirituality could be defined as maintaining a relationship with a higher power through prayer and meditation. One caregiver from the moderate persistent group described what her grandma did growing up, "…if we got sick, my grandma would take us down to the beach because she said the salt air would help us cleanse the inside of our immune system. Until that, I still believe in that, I do that to my little one, especially to my newborn, if I don't have a humidifier, then I'd go out there and you know spend half of the day letting them inhale all of that salt air you know." C7.

Caregiver response to asthma included having a plan to address asthma symptoms and maintaining awareness of when a child with asthma was ready to self-manage his or her care. Thirteen caregivers (mild=4, moderate=5, severe=4) were assessed

through observation and assessment of active symptoms what to do next for a child with asthma symptoms. Four caregivers of a child with mild persistent asthma described observing the child before intervening. Similarly, 5 caregivers of a child with moderate persistent asthma established a process to respond to asthma symptoms. The process included having the child remain inside, take a shower, rub down, and rest. If symptoms worsened, the child would be taken to the emergency room or the doctor's office for further direction on asthma care, including medication use. Moderate persistent asthma caregivers provided a nurturing environment that assisted with responding to asthma. For a child with severe persistent asthma, 4 caregivers were vigilant in asking the child about his or her symptoms. Interventions depended on how the child responded. If the asthma symptom was a cough, then the caregiver monitored the cough; if wheezing was present, then the child was placed on the nebulizer. Consistently, 2 caregivers of a child with mild and severe persistent asthma indicated that children who were 7 years or older with asthma were ready to take on responsibilities related to self-management. Responsiveness to care relied on caregivers' observations and assessment of the child with asthma. This responsiveness required the caregiver to intervene using various levels of non-medical and medical care.

Preventing exposure to asthma triggers is key to asthma management, as is the use of medication. Caregivers across all severity types indicated that vigilant keeping of a clean home prevented exposure to asthma triggers. As such, 6 caregivers (mild=2, moderate=4) monitored children's exposures to known triggers such as mold, dust, and cockroach droppings. Four caregivers (mild=2, moderate=2) described monitoring weather reports for vog to prevent asthma, 1 caregiver from the mild persistent group commented, "…keep tabs on the weather, kind of just know when the vog is coming and stuff like that." C2. Similarly, caregivers of all asthma severity types (n=18) discussed the use of medication. However, the use of daily control medications was infrequently discussed. Medication was used to treat asthma symptoms but seldom used to prevent them. Caregivers also described the use of controller medication and the importance of using the medication. A caregiver of the severe persistent group stated, "…just trying to explain, how it can be a benefit, and once they got older and realized that it did benefit them, they'll go and get it themselves." C15.

Discussion

Through in-person face-to-face interviews, Native Hawaiian caregivers shared their perspectives about asthma management. Consistent with other ethnic and racial minority groups, the perceived cause of asthma was both heredity and environment.[15-19] Native Hawaiian caregivers, however, did not describe asthma as unpredictable and "silent," which was found among Mexican mothers.[20] Rather, Native Hawaiian caregivers watched for symptoms that were considered precursors to an asthma episode. As a result, Native Hawaiian caregivers were hypervigilant. The literature on Hispanics and Native Hawaiians described the perceived cause of asthma through the worldview of a cultural health belief system.[21-22] This worldview identified the cause of asthma to be an imbalance. For Native Hawaiians in this study, *pono* (balanced, harmonious life) was discussed to manage asthma, not as a cause.

Managed pediatric asthma included medication, learning asthma self-management, physical activity, living environment, and alternative management strategies. These management strategies were extensively discussed in the literature among ethnic/racial minority groups.[18,23-25] However, specific to the Native Hawaiian caregivers was the use of saltwater as treatment of asthma. Also, spirituality using prayer and belief of a connection with a higher being was found among Native Hawaiians and Hispanics.[16,26-27]

Medication management was used among caregivers. However, in previous studies, ethnic/minority caregivers expressed fears associated with the long-term use and potential side effects.[19,23] Among Native Hawaiian caregivers, prescription medication was used when symptoms were exacerbated. Caregivers in this study did express similar concerns on the long-term use of medication.

Caregivers described self-management strategies as an approach into which the child grew. Native Hawaiian caregivers worked with his or her child to identify symptoms and the appropriate management strategy. As the child grew, he or she would independently manage his or her asthma symptoms. Similarly, a study among Mexican American and African American parent and child dyads demonstrated a shift in responsibility as the child aged.[28]

The lived environment and weather impacted how a caregiver managed his or her child's asthma. For Native Hawaiians, this meant that caregivers monitored weather reports and adjusted a child's activity based on the weather reports, and clothing them accordingly. Maintaining a clean home to manage asthma was found among Native Hawaiians and other ethnic/racial minority groups.[29-30]

Alternative management strategies such as menthol-based ointment, essential oils, and massage were used by Native Hawaiians and other ethnic minority groups. The use of menthol-based ointment was discussed among Native Hawaiian caregivers and found to be a strategy used among Hispanic groups.[31] For Native Hawaiians, menthol-based ointment was used in conjunction with massage and often a strategy passed down from generation to generation. Similarly, essential oils were used in a humidifier or on a cloth placed nearby for inhalation. For Hispanic groups, menthol-based ointment and essential oils, and other herbal remedies were often used to manage a child's asthma.[21,31] Throughout this study, caregivers frequently spoke about the use of seawater. The literature described the

use of saltwater cleanses or exposure to sea air as part of the healing practices. Seawater was considered a universal remedy by Native Hawaiians.[11]

The use of traditional cultural arts may be considered as a management strategy. Among aboriginal children in Australia, the use of singing and playing the digeridoos improved asthma.[32] Similar Native Hawaiian traditional cultural arts such as *hula* (dance), *meleana* (singing), and *oli* (chanting) may be possible asthma management strategies.

The strength of this study included increasing awareness of the cultural belief's influence on health practices. The study shows that Native Hawaiian caregivers are interested in learning about Native Hawaiian cultural practices for managing pediatric asthma. The study contributes to the literature by describing Native Hawaiian caregivers' beliefs about the causes of asthma, strategies for managing asthma, and awareness of Native Hawaiian cultural practices related to asthma.

Study limitations included methodology, method, sample size, and selection bias. The use of qualitative descriptive is not grounded in a specific qualitative philosophy. Instead, it is based on existing knowledge and seeks to describe the experience using the participant's words.[33] The use of a one-time cross-sectional face-to-face interview with the Native Hawaiian caregiver fostered a talk-story approach with caregivers. However, because the interview was a one-time occurrence, it did not allow for an in-depth gathering of the caregiver's lived experience. Due to the convenience sample and limited size, the results are not generalizable.

Conclusion

Healthcare providers working with Native Hawaiian caregivers who have a child with asthma should not assume that they implement cultural practices or are knowledgeable about cultural practices in managing asthma symptoms. Providers should assess the caregivers' health belief system and how culture influences this belief system. This assessment will orient the provider to the caregivers' worldview and aid in developing a meaningful asthma action plan. The development of an asthma action plan is a part of the National Asthma Education Prevention Program recommendation.[34] An assessment on the use of medication in conjunction with cultural practices may reduce potential harm. As children get older, assess their readiness to self-manage. Once ready, provide age-appropriate health education.

Future research should further explore the role and influence of the living environment and the role and influence of culture on health practices among Native Hawaiian caregivers whose child has mild, moderate, or severe persistent asthma. Exploring these areas to understand the impact of the lived environment and how caregivers manage asthma symptoms may provide a broader understanding of how pediatric asthma is managed.

Conflict of Interest

None of the authors identify any conflict of interest.

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Appendix

Interview Questions

Before we start, can you tell me, what is one thing you do with your child/children? [Summarize and begin interview questions]

1. What do you believe causes asthma?
2. How do you take care of your child's asthma?
   a. What treatments have you used?
   b. What treatments do you use?
   c. Which treatments do you consider to be a Native Hawaiian cultural practice?
   d. Which cultural practices have you tried?
   e. What was your experience with the cultural practice?
   f. How do you tell the difference between a Native Hawaiian cultural practice and one that is not?
   g. What role does culture play in how you take care of your child's asthma?
3. Are there other Native Hawaiian cultural practices you know about that are used to take care of asthma?
4. If yes, what?
   a. How do you find out about the cultural practices for taking care of asthma?
   b. How does the cultural practice work?

That is the end of our questions. Is there anything else you would like to share on the topic of how you take care of your child's asthma?

Chronic Cough as a Presenting Symptom of a Giant Thoracic Aortic Aneurysm: A Case Report

Ali Hussain MD; Zhaohui Arter MD; and Alvin C. Yiu MD

Abstract

Chronic cough has a broad differential, and thoracic aortic aneurysm (TAA) is a rare but potentially life-threatening etiology. We present a giant arch TAA in a non-dyspneic, Pacific Islander man with significant tobacco-use history who presented with chronic cough with no acute pulmonary process noted on imaging. Given the high mortality rates associated with thoracic aortic aneurysms, the purpose of this report is to highlight the importance of keeping TAA as a rare differential for chronic cough, particularly when caring for patients with elevated risk. Recognition of patients with thoracic aortic disease who have a class I indication for surgical intervention (meaning there is evidence or general agreement that surgery will be beneficial, useful, and effective) as well as prompt evaluation of their anatomical landmarks in the perioperative period is critical. Imaging and, in particular, computed tomography remain the optimal modalities to screen for thoracic aortic disease.

Keywords

Thoracic Aortic Disease, Aneurysm, Cardiology, Cardiothoracic Surgery, Internal Medicine

Abbreviations and Acronyms

CABG = coronary artery bypass graft
COPD = chronic obstructive pulmonary disease
CT = computed tomography
ER = emergency room
PAH = pulmonary arterial hypertension
TAA = thoracic aortic aneurysm
TAD = thoracic aortic disease

Introduction

Thoracic aortic disease (TAD) is primarily managed with surgery, but optimal management greatly depends on appropriate workup.[1] For individuals older than 65, thoracic aortic aneurysms are considered the 17th most common cause of death.[2] Broadly, the Centers for Disease Control and Prevention has ranked complications secondary to aortic aneurysms such as dissections and ruptures as high as the 19th leading cause of death in the United States, and they are estimated to cause 43 000–47 000 deaths annually.[3] In the absence of surgical repair, unexpected rupture of aortic aneurysms is almost uniformly fatal.[4] The data for outcomes of non-operative management of descending thoracic aortic aneurysm (TAA) is dismal.[4] The majority of TAA are fusiform, but up to 20% of aortic aneurysms may be saccular.[4] In comparison to fusiform aneurysms, which are thought to arise secondary to wall degeneration from atherosclerosis, saccular aneurysms have a more varied etiology, including aortic infection vasculitides, trauma, atherosclerosis, and previous aortic surgery.[5,6,7] Connective tissue disorders, such as Marfan syndrome, are also associated with TAAs. Notably, saccular aneurysms were more frequently observed in the thoracic aorta than in the abdominal aorta.[4] Tobacco cessation, hypertension management, and lipid-lowering therapy are important risk modifiers. Repair is indicated when the aneurysm expands > 5.5 cm or undergoes rapid expansion ≥ 5 mm per year. Fluoroquinolone use is associated with an increased risk of aortic aneurysm dissection or rupture and should therefore be avoided in patients known to have aortic aneurysms.[8] For the descending aorta, an aneurysm > 6 cm is associated with a cumulative 15.6% risk of rupture, dissection, or death. In comparison, the mortality rate for patients who have undergone elective surgical repair of TAA is 4% to 21%, on average 13.9%.[9]

Case Report

An 81-year-old Pacific Islander man with a past medical history significant for a 30 pack-year smoking history (quit using tobacco in 2000), well-controlled type II diabetes mellitus (hemoglobin A1c: 7.3), and essential hypertension presented to his primary care physician reporting several months of a productive cough with non-bloody sputum. His other past medical history included hyperlipidemia, allergic rhinitis, gastroesophageal reflux disease, chronic kidney disease stage II (baseline serum creatinine 1.39 with a glomerular filtration rate of 74), erectile dysfunction, and benign prostatic hyperplasia. Notably, he did not have a personal nor family history of connective tissue disease, including Marfan syndrome, nor did he have a history of chronic obstructive pulmonary disease (COPD).

His blood pressure in the primary care physician's office was 160/85 mm Hg with a heart rate of 91. He was afebrile (temperature: 97.8°F), with a respiratory rate of 18 and an oxygen saturation of 98% on room air. Outpatient chest x-ray was concerning for a large thoracic aneurysm (Figure 1). Subsequently, he was sent to the emergency room (ER) for further workup, where a non-contrast chest computed tomography (CT) scan confirmed a large saccular aortic arch aneurysm (8.3 cm) without any leaks (Figure 2). The aneurysm was noted to extend anteriorly and inferiorly. The origin of the aneurysm was just distal to the takeoff of the left subclavian artery. The neck of the aneurysm measured 6.7 cm x 4.0 cm, and the overall area measured 8.3 cm x 7.2 cm x 2.3 cm. Gated CT of the aorta with contrast further confirmed the size and location of the aneurysm (Figure 3). Three-dimensional reconstruction of the aneurysm

from the Gated CT of the aorta is shown in Figure 4. There was no evidence of aortic dissection nor aortic wall rupture. Furthermore, in 2011, a screening abdominal aortic ultrasound was conducted, which ruled out an abdominal aortic aneurysm but noted a slightly ectatic (dilated) aorta measuring 2.5 cm.

His outpatient medications included alogliptin 12.5 mg once daily, metformin 1000 mg once daily, amlodipine 5 mg once daily, chlorthalidone 25 mg once daily, lisinopril 20 mg once daily, omeprazole 20 mg once daily, rosuvastatin 5 mg once daily, sildenafil 100 mg as needed, tamsulosin 0.4 mg once daily, finasteride 5 mg once daily, cyanocobalamin 500 mcg once daily, and folic acid 1 mg once daily.

In the ER, the patient's blood pressure was 202/107 mm Hg, and he was admitted to the hospital for hypertensive urgency and further evaluation and workup of the TAA. The lungs were clear bilaterally, and his heart showed regular rate and rhythm without murmurs, rubs, or gallops. Upper and lower extremities had 2+ pulses bilaterally. Transthoracic echocardiogram noted grade II diastolic function, aortic root measuring 4.3 cm, trileaftlet aortic valve, aortic sclerosis without stenosis, and normal systolic function with an estimated ejection fraction of 50% to 55%. Given that the CT scan noted atherosclerotic cardiovascular disease, pre-operative cardiac catheterization was obtained to evaluate the need for simultaneous intraoperative coronary artery bypass graft (CABG). Catheterization revealed moderate non-obstructive coronary artery disease with 50% to 70% stenosis in the mid-left anterior descending artery, 50% stenosis in the proximal left circumflex artery, and less than 25% stenosis within the right coronary artery. Therefore, CABG was not recommended as part of the operative plan. Following a detailed discussion with the patient and family members about the risk versus benefit of surgery, and given that the thoracic aortic aneurysm > 5.5 cm, aggressive blood pressure control was warranted and achieved with a goal of no greater than 130/80 mm Hg through esmolol drip. It was deemed that the patient had a class I indication for surgical intervention. He was determined to be a poor candidate for total endovascular aortic repair alone and required an expanded debranching aortic surgery. After an extensive discussion about the risks and benefits of surgery, the patient and family opted for definitive surgical management.

Post-operatively, the patient was transferred to the intensive care unit for recovery and neurovascular monitoring. He was extubated on postoperative day 1, and postoperative CT scans demonstrated an unchanged large saccular aortic arch aneurysm without any significant pulmonary pathology. In the ensuing days, the chest tube output remained minimal, but the patient continued to experience the same non-bloody, productive cough which had resulted in his initial presentation. Upon further investigation, flexible fiberoptic nasopharyngeal endoscopy revealed normal vocal cords. He was treated for gastroesophageal reflux disease with a proton pump inhibitor, which was also ineffective in resolving his cough. On postoperative day 10, the patient syncopized and died after an extended coughing fit.

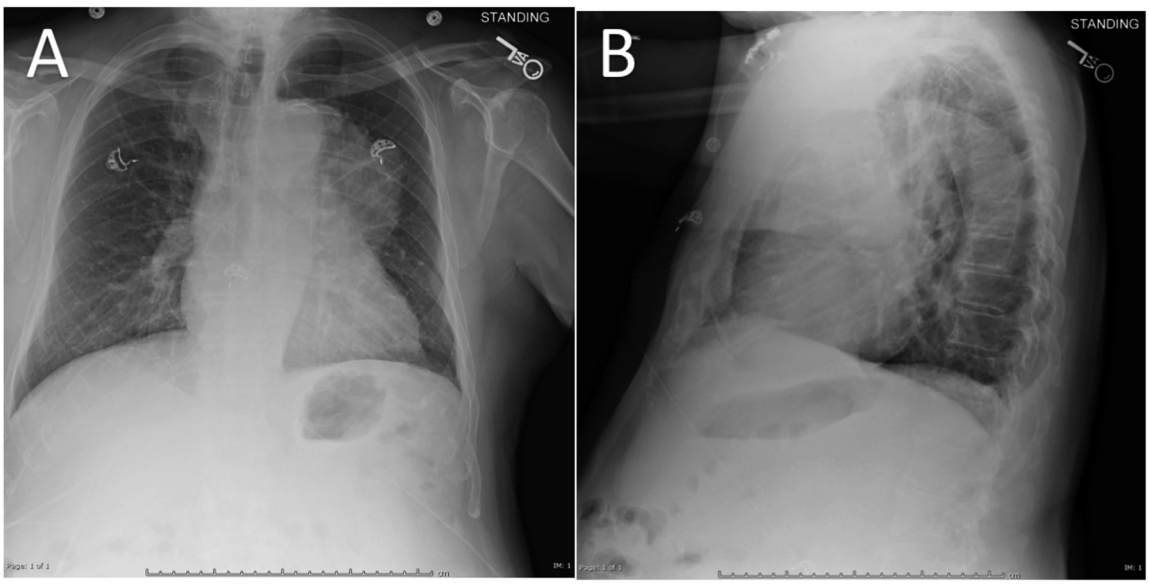

Figure 1. Outpatient Chest-X ray (Posterior-Anterior and Lateral) Demonstrating A Widened Mediastinum With A Probable Thoracic Aortic Aneurysm.

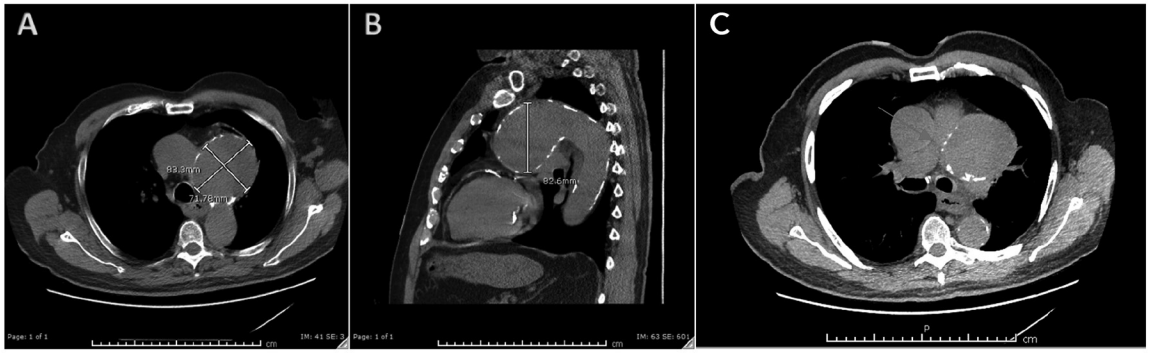

Figure 2. Non-contrast Computed Tomography Scan of the Chest. The axial view (A) and the sagittal view (B) show the 8.3-cm-diameter saccular aneurysm extending from the lateral anterior aspect of the aortic arch. Another axial view (C) demonstrates pulmonary vascular compression.

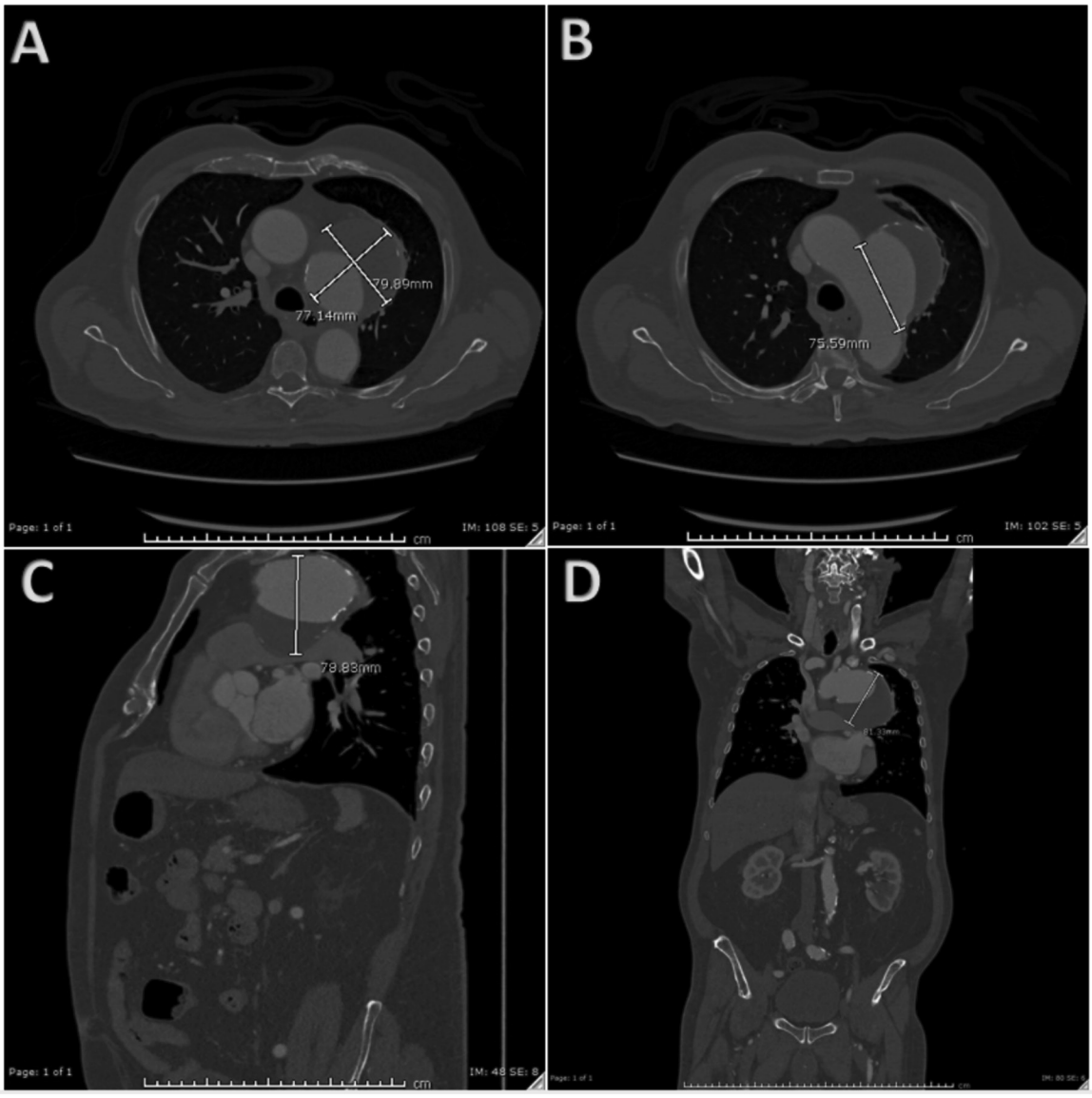

Figure 3. Gated Computed Tomography Scan of the Aorta. Scan with contrast shown in axial view (A and B), sagittal view (C), and coronal view (D) showing a large, saccular aneurysm involving the proximal aspect of the descending aorta just distal to the takeoff of the left subclavian artery, which measures approximately 7.7 cm x 7.9 cm x 8.1 cm in size (see labels).

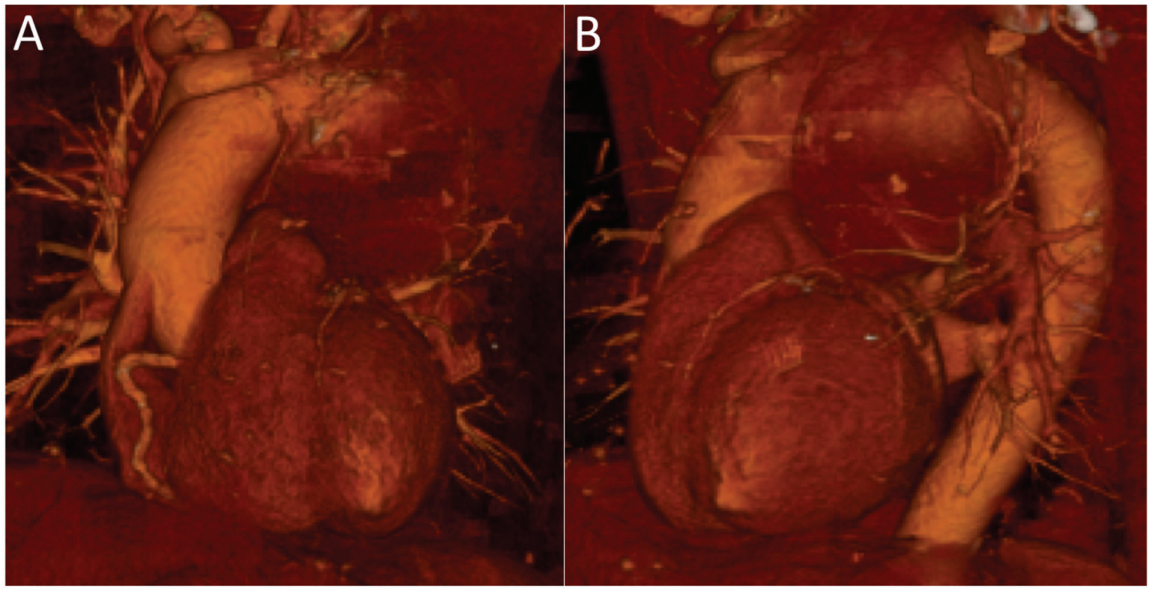

Figure 4. Three-Dimensional Computed Tomography Reconstruction of the Saccular Aortic Aneurysm. Coronal view (A) and sagittal view (B).

Discussion

Given that the patient's cough persisted in the postoperative period, it is reasonable to consider that the persistently elevated intrathoracic pressure contributed to a hemodynamic catastrophe, ultimately leading to death. Differentials worth considering include endoleak versus dissection versus rupture. Symptomatic management of the patient's cough, which included evaluation of vocal cord dysfunction and treatment for post-nasal drip and gastroesophageal reflux disease, was ineffective. The patient did not have a history of COPD, was never prescribed any medications for COPD, and his chest imaging was not consistent with a diagnosis of COPD. However, the patient also never underwent pulmonary function testing. The thoracic CT scan did not reveal any pulmonary nodules nor significant mediastinal lymphadenopathy. Ultimately it was thought that his cough possibly resulted from mass effect or compression of pulmonary vasculature by the giant TAA (Figure 2C). The mechanism of cough was thought to be similar to that of pulmonary arterial hypertension (PAH) because arterial blood flow to the lungs was traversing a narrower lumen due to mass effect. This narrowing would conceivably lead to elevated pulmonary arterial pressure. Although the precise pathophysiology of cough in PAH is unclear, Achouh et al. have suggested extrinsic small airway compression in PAH, leading to cough. Several studies also point towards small airways disease in PAH.[10] Other etiologies considered included compression of the mainstem bronchi versus the vagus nerve or a combination thereof.

Previously, there have been a few case reports of chronic cough as the presenting symptom of TAAs.[11–13] Of particular note is 1 case, where a saccular aortic aneurysm with a mural thrombus was noted to compress the left pulmonary artery and left mainstem bronchus, which was ultimately thought to be the etiology of persistent cough and hoarseness in a 71-year-old man with long-standing systemic hypertension.[11] Another case report noted the evaluation of chronic cough in a 65-year-old man with a history of hypertension and prior tobacco use, which revealed a giant thoraco-abdominal aortic aneurysm, which compressed the left main bronchus and its inferior branch.[12] Finally, 1 report noted cough as a presenting symptom of a sizeable thoracic aortic aneurysm in a 61-year-old man with a history of smoking, but that report did not comment on adjacent mass effect from the aneurysm.

Although it is unclear if our patient's cough was secondary to mass effect (Figure 2C) of his giant thoracic aortic aneurysm, this case adds to few other cases noted in the literature, which report cough as a presenting symptom of giant thoracic aortic aneurysm. Thoracic aortic disease (TAD) is typically asymptomatic but warrants a high degree of suspicion when evaluating cough in patients at an elevated risk of developing TAD. Such patients include those with a significant tobacco use history, history of hypertension, and those with genetic predispositions (Marfan syndrome, Loeys-Dietz syndrome, Takayasu arteritis, Bechet disease, and Giant cell arteritis).[13]

This case exemplifies high-risk surgery with higher than average morbidity and mortality in a patient older than 65 years, 15.6% mortality without surgery, and 13.9% mortality with elective repair in the average patient. Nonetheless, surgery was a class I indication because it was the only intervention with the pos-

sibility of efficacy. Here, shared-decision making between the patient and provider was invaluable for deciding on such an intervention. After extensive discussion with the patient and family describing the risks and benefits of this surgery, including intra-operative complications, postoperative complications, the possibility of prolonged life-support, and death, the patient and family opted for surgery.

Alternatively, the consequences of not proceeding with surgery would have been catastrophic, as evident by the esmolol drip requirement in the perioperative setting as well as the dismal data on non-operative management of thoracic aortic disease.[4] A large study about older adult patients and procedures, "Knowing the Risk" study, showed that patients > 80 years had 13 times the mortality rates of those younger than 65 years and 4.6 times those 65–80 years. However, the survival rate of those older than 80 years remained a respectable 93.6%.[14] Therefore, offering surgery to the patient was thought to be both medically and ethically indicated.

Conflict of Interest

None of the authors identify a conflict of interest.

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Immunoepigenetic-Microbiome Axis: Implications for Health Disparities Research in Native Hawaiians and Pacific Islanders

Noelle C. Rubas MS and Alika Maunakea PhD

In 1993, the Medical School Hotline was founded by Satoru Izutsu PhD (former vice-dean UH JABSOM), it is a monthly column from the University of Hawai'i John A. Burns School of Medicine and is edited by Kathleen Kihmm Connolly PhD; HJH&SW Contributing Editor.

Abstract

Native Hawaiian and Pacific Islander (NHPI) populations suffer from disproportionately higher rates of chronic conditions, such as type 2 diabetes, that arises from metabolic dysfunction and are often associated with obesity and inflammation. In addition, the global coronavirus disease 2019 pandemic has further compounded the effect of health inequities observed in Indigenous populations, including NHPI communities. Reversible lifestyle habits, such as diet, may either be protective of or contribute to the increasing prevalence of health inequities in these populations via the immunoepigenetic-microbiome axis. This axis offers insight into the connection between diet, epigenetics, the microbiome composition, immune function, and response to viral infection. Epigenetic mechanisms that regulate inflammatory states associated with metabolic diseases, including diabetes, are impacted by diet. Furthermore, diet may modulate the gut microbiome by influencing microbial diversity and richness; dysbiosis of the microbiome is associated with chronic disease. A high fiber diet facilitates a favorable microbiome composition and in turn increases production of intermediate metabolites named short-chain fatty acids (SCFAs) that act on metabolic and immune pathways. In contrast, low fiber diets typically associated with a westernized lifestyle decreases the abundance of microbial derived SCFAs. This decreased abundance is characteristic of metabolic syndromes and activation of chronic inflammatory states, having larger implications in disease pathogenesis of both communicable and non-communicable diseases. Native Hawaiians and Pacific Islanders that once thrived on healthy traditional diets may be more sensitive than non-indigenous peoples to the metabolic perturbation of westernized diets that impinge on the immunoepigenetic-gut microbiome axis. Recent studies conducted in the Maunakea lab at the University of Hawai'i at Mānoa John A. Burns School of Medicine have helped elucidate the connections between diet, microbiome composition, metabolic syndrome, and epigenetic regulation of immune function to better understand disease pathogenesis. Potentially, this research could point to ways to prevent pre-disease conditions through novel biomarker discovery using community-based approaches.

Keywords

ethnic health disparities, immunoepigenetic-microbiome axis, intestinal microbiome, metabolic syndrome, SARS-CoV-2, COVID-19 severity, short-chain fatty acid, type II diabetes risk

Abbreviations

COVID-9 = coronavirus disease 2019
HDAC = histone deacetylase
HFD = high fiber diet
GCPR = G protein-coupled receptor
NHPI = Native Hawaiians and Pacific Islanders
SCFA = short chain fatty acid
SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2

Introduction

Health disparities among minority populations across the US include higher rates of metabolic syndrome, a condition that can arise from persistent low-grade systemic inflammation. Common characteristics of this syndrome include obesity, insulin resistance, hypertension, and dyslipidemia.[1] Native Hawaiians and Pacific Islanders suffer from the fastest rising prevalence rate of type 2 diabetes globally, in part due to socioeconomic constraints that restrict their access to healthy dietary options and lead to metabolic and immune dysregulation.[2-4] Diet contributes to the development of both metabolic and immune function via the immunoepigenetic-microbiome axis that functions to establish and maintain metabolic homeostasis. Unhealthy diets alter gut microbiome composition leading to dysbiosis and aberrant regulation associated with increased local and systemic inflammation and metabolic dysfunction.[5]

The Maunakea lab located at John A. Burns School of Medicine is part of the Institute for Biogenesis Research in the Department of Anatomy, Biochemistry and Physiology. The lab focuses on the biological mechanisms underlying health disparities and studies diet as both an epigenetic modulator and as a potential intervention to reverse health inequities. Community-based participatory research studies that have engaged NHPI individuals and their social networks have offered new insight into the connection between diet, epigenetics, the microbiome composition, immune function, and response to viral infection. The lab refers to these interactions as the immunoepigenetic-microbiome axis. This article summarizes each component of this network and highlights the importance of understanding the relationships in the context of metabolic function and disease outcomes.

The Intestinal Microbiome

The gut microbiome plays a key role in metabolic syndrome and overall human health. Because microbiota facilitate functions in metabolic and immune responses, dysregulation of the gut microbiota that results in changes in the abundance and diversity of protective microbial species (ie, dysbiosis) is implicated in adverse health outcomes and disease progression.[5] Dietary choices can influence microbiome composition and health outcomes, and there are differences observed between individuals who consume a westernized diet that is high in processed foods, animal protein, and low in dietary fiber, versus a non-westernized traditional diet that is plant-based and high in fiber.[5]

For example, fiber consumption has positive influences on microbiome composition and is usually associated with non-westernized diets.[6] Non-digestible carbohydrates, also known as insoluble fiber or dietary fiber, are found in whole grains and some fruits and vegetables. The human gastrointestinal tract lacks digestive enzymes to process these sources of dietary fiber, but the gut microbiota utilizes insoluble fiber to synthesize short chain fatty acids (SCFAs) such as butyrate, acetate, and propionate via bacterial fermentation. SCFAs represent epigenetic regulators of the microbiome-immune axis and are mediators of immune activation. Locally, SCFAs such as butyrate are the main source of cellular energy of the colonic epithelium and contribute to strengthening the gut barrier and reducing intestinal inflammation. Systematically, SCFAs promote cellular metabolism and activate signaling cascades to regulate immune functions in colonic tissue and circulating immune cells.[7]

Immunoepigenetic-Microbiome Axis and Immunomodulatory Metabolites

The interactions between microbial derived metabolites and epigenetic regulation of immune cell function, part of the immunoepigenetic-microbiome axis, influence overall immune function and play major roles in disease. The innate immune system is shaped by epigenetic processes as seen in inflammatory states precursing type 2 diabetes pathogenesis. Microbial derivatives stimulate the innate immune system to cause cascading events that initiate transcriptional responses in specific cell types. Epigenetic modulators such as SCFAs recruit transcription factors, prevent expression of mediators, and repress or activate secondary gene programs responsible for metabolic functions such as histone modification and DNA methylation. Additionally, SCFA metabolites regulate immune responses resulting in either pro-inflammatory or anti-inflammatory cascades.[8]

SCFAs are important mediators between the intestinal microbiome and immune system. In the local gut environment, SCFAs strengthen gap junctions and epithelial barrier integrity.[9] In doing so, they reduce the opportunity for pathogenic bacteria to elicit inflammatory cascades in macrophage and monocyte immune cells. Additionally, SCFAs are actively transported through the epithelial barrier and up taken by lymphocytes to further mediate immune activation. SCFAs have 2 major signaling mechanisms: inhibition of histone deacetylases (HDAC) and activation of G protein-coupled receptors (GPCRs). HDACs epigenetically regulate gene expression and are implicated in anti-inflammatory immune programming. SCFAs are ligands of GPCRs such as GPR41, GPR43, and GPR109A that are expressed on a wide variety of cells, including hematopoietic tissues and their derivative immune cells indicating modulatory activity of immune cell development and differentiation to produce anti-inflammatory states (Figure).[9]

Epigenetic Modulation to Reduce Type 2 Diabetes Risk

The *Mauli Ola* study is an ongoing community-based research project of the Maunakea lab that includes NHPI participants interning at MA‘O Organic Farms in Wai‘anae, O‘ahu. This study provides an example of how diet-mediated changes in the gut microbiome can impact epigenetic regulation of the inflammation linked to glycemic control and risk for type 2 diabetes. Data from this study have revealed that individuals with higher fiber intake modulate their risk for type 2 diabetes as measured by changes in levels of hemoglobin A1c, a biomarker of glycemic control. The changes in A1c appeared to be mediated by increased butyrate-producing gut bacteria and associated with decreased systemic inflammation, which is consistent with other studies.[10] Additionally, butyrate reduces systemic inflammatory cytokines IL-1b, TNF-a, IFN-g, IL-6 and MCP-1; the genes encoding these cytokines are epigenetically regulated. This in turn causes a systemic cascade to decrease inflammation in the pancreas and adipose tissue, ultimately eliciting homeostatic regulation of glucose uptake and insulin production. Furthermore, SCFA microbiota are associated with increased production of gut hormones PYY and GLP-1 which act through molecular pathways to further reduce type 2 diabetes by initiating insulin release, glucose uptake, and fatty acid oxidation.[10]

Diet, Microbiome and Type 2 diabetes

The results from the *Mauli Ola* study offers insight into the mechanisms in which SCFAs influence metabolic functions and reduce type 2 diabetes risk. Participants whose gut microbiomes exhibited increased alpha diversity scores, attributed to consuming high fiber diets (HFD), had greater capacity to produce SCFAs. This is because greater diversity was associated with increased abundance of SCFA-producing microbiota. Furthermore, participants with greater microbial diversity had increased presence of the butyrate kinase (Buk) gene and subsequent production of the butyrate kinase enzyme in the gut microbiome. Presence of the Buk gene enables microbiota to ferment non-digestible fiber into butyrate and this metabolic capacity was significantly associated with decreased type 2 diabetes risk. Notably, participants with confirmed type 2 dia-

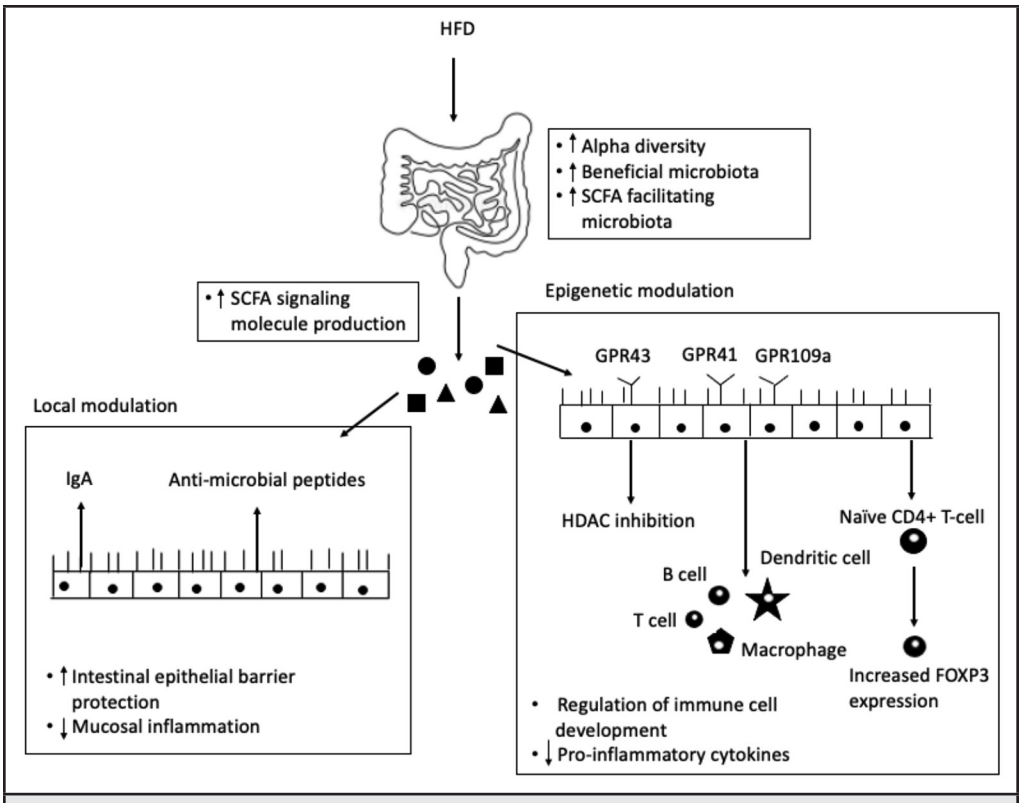

Figure. Diagram of the Immunoepigenetic-Microbiome Axis. Consumption of a high fiber diet enhances gut microbiome health and metabolic output to decrease systemic inflammation.

Abbreviations: HFD, high fiber diet; SCFA, short chain fatty acid; HDAC, histone deacetylase

betes suffered from a characteristically dysbiotic microbiome with constrained host-symbiotic interactions, elucidating possible dietary interventions to minimize or reverse pathogenesis of type II diabetes. Further research in the Maunakea lab is currently underway to investigate how the youth-targeted, land-based programs of MA'O Organic Farms may offer an innovative intervention to ameriorate type II diabetes risk in the NHPI community.

Microbiome Composition and SARS-CoV-2

In another study of the Maunakea lab, data from participants recovering from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection offered insights into how the immunoepigenetic-microbiome axis impact the development of coronavirus disease (COVID-19). Initial results of this study indicate that the gut microbiome appears to play a major role in the host-viral response and in some cases was protective against severe pathogenesis. Specifically, in comparison to those who harbored low gut microbiome diversity as measured by DNA sequencing technologies, participant plasma samples who exhibited a more diverse microbiome were able to neutralize the SARS-CoV-2 virus with better efficacy in *ex vivo* assessment; these individuals also experienced less severe symptoms of COVID-19. In addition, those with pre-existing conditions, such as obesity, tended to experience more severe symptoms of COVID-19 and had an attenuated immune response during recovery, which was associated with dysbiosis of the gut microbiome beyond what is characteristic of people with obesity. Although preliminary, these results reinforce the concept of a relationship between immune function and gut microbial composition. Given the protective role of a more diverse microbiome that is characteristic of a HFD, the work of the Maunakea lab implicates that interventions that include diet to reduce diabetes and/or obesity risk may be potentially useful to prevent and/or mitigate severe COVID-19 progression.

Conclusion

Systematically imposed socioeconomic constructs on Indigenous communities are partially responsible for unhealthy lifestyle choices that include poor nutrition. This has fostered the manifestation of gut microbiome dysbiosis that contributes to epigenetically altered immune responses and leads to the onset of inflammation underlying the progression of non-communicable diseases. Dysregulation of the immunoepigenetic-gut microbiome axis acts as a preface for many inflammatory related diseases because gut dysbiosis leads to increased intestinal

permeability and subsequent mucosal inflammation. Prolonged perturbation of the immunoepigenetic-gut microbiome may be responsible for inducing systemic inflammation via epigenetic reprogramming of immune cells to influence lineage differentiation to pro-inflammatory states.

Thus, it is essential to study the immunoepigenetic-gut microbiome axis in diverse populations where access to healthy traditional diets is limited in order to better understand the degree such diets might serve to restore health in populations with high risk for metabolic diseases. Modifying diet offers interventional opportunity to enhance gut microbiome resilience and re-establish healthy metabolic and immune function. Understanding the impact of dietary modifications on the composition and function of the microbiome for favorable characteristics may allow for manipulation of the immunoepigenetic-microbiome axis to reduce metabolic dysregulation and deter onset of inflammation implicated in obesity and other co-morbidities associated with type 2 diabetes. Incorporating diet interventions can improve SCFA metabolite production, which could combat systemic inflammation through the immunoepigenetic-gut microbiome axis and may even protect against severe disease from viral infections such as COVID-19. As the microbiome is labile over the course of a lifetime and can rapidly respond to modifications, dietary interventions that consider the immunoepigenetic-microbiome axis may reveal new therapeutic and preventative strategies for populations afflicted by diseases of health disparities.

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The Thompson School of Social Work & Public Health: Continuing a Strong Legacy of Research, Training, and Service Towards Social Justice and Health Equity

Theresa Kreif MSW, LSW; William Chismar PhD; Kathryn L. Braun DrPH;
Michael DeMattos MSW; Tetine Sentell PhD; Jing Guo PhD; and Noreen Mokuau DSW

Social Work in Action is a solicited column from the social work community in Hawai'i. It is edited by HJHSW Contributing Editor Sophia Kim PhD, of the Thompson School of Social Work & Public Health at the University of Hawai'i at Mānoa.

New Name, Enhanced Vision

In 2016, we began work to strengthen collaborations between social work and public health and, in December 2020, our school officially became known as the *Thompson School of Social Work & Public Health*. With this new name comes an enhanced commitment to research, education, and service in social justice and community health and well-being. We continue to build on the deep and valuable legacy of our namesake Myron "Pinky" Thompson and towards our vision of *achieving social justice and health equity for the people of Hawai'i and citizens in a changing world.*[1] This article highlights our history and our investments in interdisciplinary teaching, research, and community service. We end by articulating goals and actions to inform, and even transform, the future.

A Strong Legacy

Over the past 85 years, social work education at the University of Hawai'i at Mānoa (UH Mānoa) has pursued a mission to generate, transmit, and apply knowledge related to social work and social welfare, with special attention to Native Hawaiian, other Pacific Islander, and Asian populations in our state and region. For more than 65 years, public health education at UH Mānoa has trained public health professionals and conducted research that benefits the people of Hawai'i and the Asia-Pacific region, honoring principles of discovery, innovation, engagement, inclusion, and leadership.

Faculty in the Department of Social Work (DSW) are experts in areas ranging from child welfare, youth development, mental health, substance use, gerontology, indigenous wellbeing, Asian and Pacific Islander health, juvenile justice, hate crimes, community intervention, health care policy, and international social welfare. Faculty in the Office of Public Health Studies (OPHS) are experts in topics ranging from infectious disease to chronic disease, from child health to end of life, from indigenous to global health, from genetics to the environment, and from health promotion and prevention to treatment and services. In 2016, these faculties chose to work together, bringing their strong independent units to form a *kauhale* (village).[1]

This merger, built on several years of collaboration, allowed us to formalize a shared vision. While each unit had its own mission and areas of expertise, it was clear that we were united in our efforts to promote social justice, advocate for the oppressed and marginalized, and enhance the health and well-being of all citizens of Hawai'i, the Pacific region, and the world. This transition from *hale* (house) to *kauhale* aimed to improve the reach of each unit through systematic and systemic collaboration as well as the maximization of resources in the areas of recruitment, research, instruction, and community service and engagement. The recent name change to the *Thompson School of Social Work & Public Health* represents the last, formal stage in the merger. Collectively, the units within the Thompson School are invested in teaching, research, and community service that is culturally anchored, community engaged, and population-focused addressing both the needs of the community as well as the strategic directions of the University of Hawai'i system and UH Mānoa.

Interdisciplinary Education

At its core an interdisciplinary school, the Thompson School prepares its students to apply interdisciplinary, community-based, and culturally focused knowledge and skills to address societal challenges and promote population-based wellbeing.[2] Students experience a very diverse set of topics areas and the value of the intersections across those areas. For example, public health develops knowledge and skills in epidemiology, environmental and indigenous health, policy development, program management, data management, and social and behavioral health. Social work develops knowledge and skills in meeting social and emotional needs from trauma and planning

for effective resolution of crises, such as pandemics, from both interpersonal and community perspectives. Students are guided to operationalize these skills through community-engaged research with faculty members and student practicums around societal needs and community networks.

More than 600 students are enrolled in degree-granting programs at the Thompson School (Figure 1).

Undergraduates may pursue a Bachelor of Social Work (BSW) or a Bachelor of Arts in Public Health (BA PH). Graduate students may pursue the Master of Social Work (MSW), a Master in Public Health (MPH), a Master of Science in Public Health (MS), or a PhD in Social Welfare, Epidemiology, or Community-based Translational Research. In addition to on-campus programs, both the BSW and MSW programs have online options, serving students across the state and Guam. The campus-based Master of Public Health (MPH) is planning to expand to include an online version with specializations in Health Policy and Management and Native Hawaiian and Indigenous Health (NHIH). Most of the PhD classes have been moved online during COVID-19, under consideration are plans to continue online attendance options for students that cannot travel to the Mānoa campus. While all programs include information on indigenous health and social welfare, the MPH in NHIH is one of the only master's programs in the world providing in-depth training in Native Hawaiian and indigenous health, including classes on data strategies in small populations, indigenous food systems, and health ethics, law, and politics around indigenous well-being. With a similar commitment to indigenous learning, the DSW has the strategic priority to build a Hawaiian place of learning. This priority is based on the belief that ancestral ways can enhance educational excellence, and is manifested in program values and interdisciplinary curriculum highlighting Hawaiian culture.

The Thompson School is also engaged with other schools to provide interdisciplinary training. For example, OPHS partners with the John A. Burns School of Medicine (JABSOM), College of Tropical Agriculture and Human Resources, and the School of Ocean and Earth Science and Technology to deliver a course on OneHealth. The course recognizes that the vast majority of emerging infectious diseases are zoonotic, meaning they start with the transmission of a microbe from animals to humans. Human encroachment on animal habitats and human consumption of wild animals contribute to the emergence of infectious diseases. Thus, students learn about the connectivity between humans, animals and the environment to develop more effective solutions to mitigate and prevent infectious diseases with epidemic potential.

The DSW leads the interdisciplinary *Ke A'o Mau* (learning preserved) program, which aims to further develop a workforce that is community-based and culturally anchored in Hawaiian knowledge.[3] Ke A'o Mau honors the genealogy of the Thompson

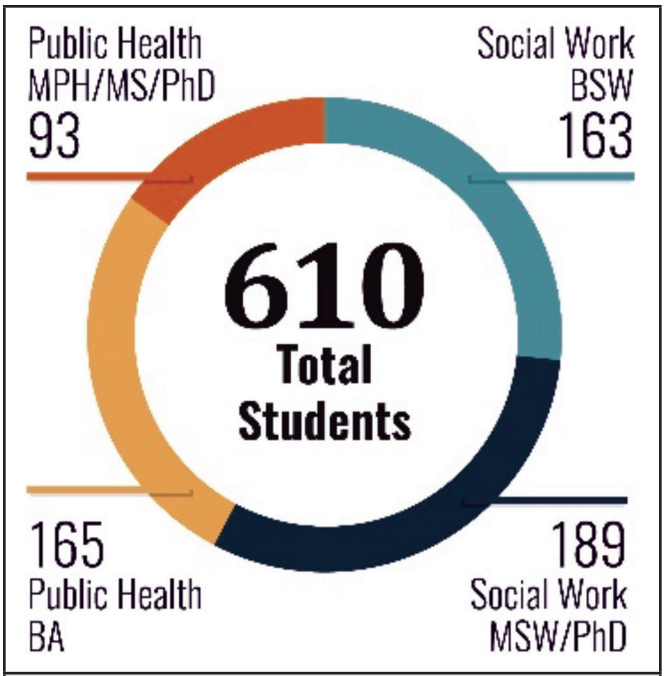

Figure 1. Thompson School Enrollment 2020

School by introducing students from social work, public health, nutrition, medicine, and other health fields to experts in Hawaiian tradition. Students engage with community-based experts in discussions of how these traditions can inform modern-day health and well-being. Students also undertake service projects in Hawaiian communities as part of the course. Ke A'o Mau is supported by The Hawai'i Pacific Foundation, and select workshops are open to the community.

The Thompson School also is an active member of the University of Hawai'i's Interprofessional Education (HIPE) program. Through HIPE, faculty members from medicine, nursing, pharmacy, public health, and social work lead students from these different disciplines to work collaboratively on "case studies" of patients facing multiple, intersecting issues.[4,5,6] For example, students from multiple disciplines may develop a care plan for an older adult whose medical problems are underlain by medication interactions, family conflict, nursing needs, and social determinants of health, including poverty, housing and food insecurity, social isolation, stress, and discrimination.

These shared perspectives are very relevant to real-world needs. Recognizing the impact on health of upstream, social determinants, healthcare systems are adding social and behavioral domains to electronic medical records (EMR).[7] Including these domains within EMR will provide important, practical data for diverse health care-related activities, including health services research, clinical practice, and patient engagement. But doing so demands an interprofessionally engaged health care workforce that can link patients to social services to address the social

determinants of health, assess community-level needs as well as individual needs, and advocate for policies and programs that can address the up-stream causes of poor health.

Interdisciplinary and Community-Engaged Research

Among several interdisciplinary research projects at the Thompson School is Hā Kūpuna National Resource Center for Native Hawaiian Elders.[8] Established in 2006, Hā Kūpuna has contributed new knowledge on Hawaiian elders to the literature and classroom on healthy life expectancy, disease risk, preferences for health and long-term care services, issues facing *keiki* (children) caring for *kūpuna* (elders) with dementia, issues facing *kūpuna* caring for grandchildren, the lives of *kūpuna* who live outside of Hawai‘i, historical wisdom from Hawaiian-language sources, and contemporary wisdom from *kūpuna* served by the Ke Ola Pono No Nā Kūpuna program of ALU LIKE, Inc. The program is funded by the US Administration for Community Living and is advised by representatives from five community-based Hawaiian-serving organizations, state and county offices on aging, and other academic units across UH Mānoa.

The Thompson School also collaborates on infrastructure building grants with JABSOM, including the Geriatric Workforce Enhancement Program, funded by the US Health Resources & Services Administration, and Ola HAWAII, funded by the National Institute on Minority Health and Health Disparities. Ola HAWAII is led by leaders in medicine, social work, and public health, with a goal to impact health disparities among priority populations including Native Hawaiians, Pacific Islanders, and Filipinos. Additionally, faculty are engaged in internationally recognized research and innovative real-life projects in health literacy and culturally-relevant communication[9] and with successful large-scale, theory-based research and training programs. Locally, OPHS has collaborated with the State of Hawai‘i Department of Health (DOH) for more than 20 years on the Healthy Hawai‘i Initiative Evaluation,[10] while DSW has collaborated with the State of Hawai‘i Department of Human Services (DHS) for more than 20 years on best practices in child welfare. All of these interdisciplinary research projects engage students to build their skills in community-responsive inquiry.

Interdisciplinary Service in Response to the COVID-19 Pandemic

The need for synergy within the Thompson School and across the University of Hawai‘i system became even more apparent with the COVID-19 pandemic. Within the Thompson School, units are responding across disciplines, in interwoven action, teaching, and research, to meet the ever-expanding and changing needs of our local and global communities towards the need for resolutions across public health and social needs. While the novel coronavirus pandemic has upended life in Hawai‘i and beyond, the Thompson School faculty, students, and alumni have been performing vital research and have engaged in action to understand and mitigate the local spread of the disease (Table 1).

Through work in our local and global communities our unit missions and collective vision have solidified our interdisciplinary alliance and further cultivated our collaborative professional leadership to advance social reform and public health. Our epidemiologists, gerontologists, global health analysts, health systems researchers, indigenous health researchers, behavioral

Table 1. Recent Publications Including Thompson School of Social Work and Public Health Students Highlighting Diverse Areas of Expertise and Engagement

Article
Congenital syphilis: A case report demonstrating missed opportunities for screening and inadequate treatment despite multiple healthcare encounters during pregnancy[11]
Community Transmission of SARS-CoV-2 at Three Fitness Facilities — Hawai‘i, June–July 2020[12]
Health Literacy, Digital Health Literacy, and COVID-19 Pandemic Attitudes and Behaviors in U.S. College Students: Implications for Interventions[13]
Gene-obesogenic environment interactions on body mass indices for older black and white men and women from the Health and Retirement Study[14]
You Think You're Stressed? Health Care Providers Need Support, Too[15]
Pandemic Highlights Health Disparities For Filipinos In Hawai‘i[16]
Protect Our Hotel Workers As Hawai‘i Reopens Tourism[17]
Perspectives and Experiences of Obstetricians Who Provide Labor and Delivery Care for Micronesian Women in Hawai‘i: What Is Driving Cesarean Delivery Rates?[18]
Social Connectedness and Homelessness Amidst a Pandemic: Are the Social Impacts of Quarantine on Homeless Populations Being Adequately Addressed?[19]
Emerging Disparities of the COVID-19 Pandemic Among Older Adults in Rural Hawai‘i[20]
A Culturally Informed Scoping Review of Native Hawaiian Mental Health and Emotional Well-being Literature[21]
Association between central sleep apnea and atrial fibrillation/flutter in Japanese-American men: The Kuakini Honolulu Heart Program (HHP) and Honolulu-Asia Aging Study (HAAS)[22]
Identifying Best Practices in Adoption, Implementation and Enforcement of Flavoured Tobacco Product Restrictions and Bans: Lessons from Experts[23]

mental health researchers, child and adolescent social welfare researchers, and faculty with other areas of expertise are collectively serving as content experts for government leaders and performing innovative research to understand the changing needs for food, eldercare, youth development, social needs, and chronic disease management. Most critically, our units are training the future workforce of epidemiologists, social workers, and other public health experts to help prevent and mitigate the effects of any future pandemics in our community and beyond.

Looking to the Future

A‘ohe pu‘u ki‘eki‘e ke ho‘ā`o ‘ia e pi‘i.
No cliff is so tall it cannot be climbed.
(Puki, 1983, 25, #209)

As the Hawaiian ‘ōlelo *no‘eau* (proverb) suggests, our new name reflects our core belief that interdisciplinary education, research, and service optimizes our success in addressing social justice and health equity in Hawai‘i and the broader society. The unique perspectives of social work and public health provide a strong foundation from which to make improvements in the social determinants of health, social justice, and health equity. The COVID-19 pandemic has revealed many problems and challenges that we, as a society, face in a health crisis; we need to find effective and equitable solutions. Through educational programs, research, and community engagement, we at the Thompson School continue to help develop professionals, practices, and policies to address these current pressing societal and health needs. But, our work goes beyond health needs.

From our shared and unique areas of expertise, we can help lead a path forward towards the *greater good* – not a good for some or for the most privileged, but for all of us. We, as the Thompson School, have the opportunity now to build on the work of sociocultural and political activists from the distant and near past, and implement strategies that promote social justice, health equity, and well-being, consequently advancing human rights for a transformative society.

The passion, engagement, and expertise of our students, faculty, alumni, and staff bring deep meaning to our work and are the building blocks for future health and wellbeing. We look forward to continuing to grow together in our shared and unique areas of strengths to provide synergistic, innovative new areas of scholarship and training in health and wellbeing for our students, workforce, community, and world. We aim to expand our community-focused and engaged workforce, emphasizing deep training in fundamental root causes, and skill-based knowledge to address social factors and create health equity in strong and resilient communities.

We are honored to continue our work, which reflects both the strategic directions of the University of Hawai‘i system and the strategic priorities of UH Mānoa and builds upon generations of community engagement, with the blessing from the Thompson ‘*Ohana* (family), as the Thompson School of Social Work & Public Health.

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